

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
SCIENCE A**

A212/01

Unit 2: Modules B2 C2 P2 (Foundation Tier)

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:

- Pencil
- Ruler (cm/mm)

**Thursday 24 June 2010
Afternoon**

Duration: 40 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

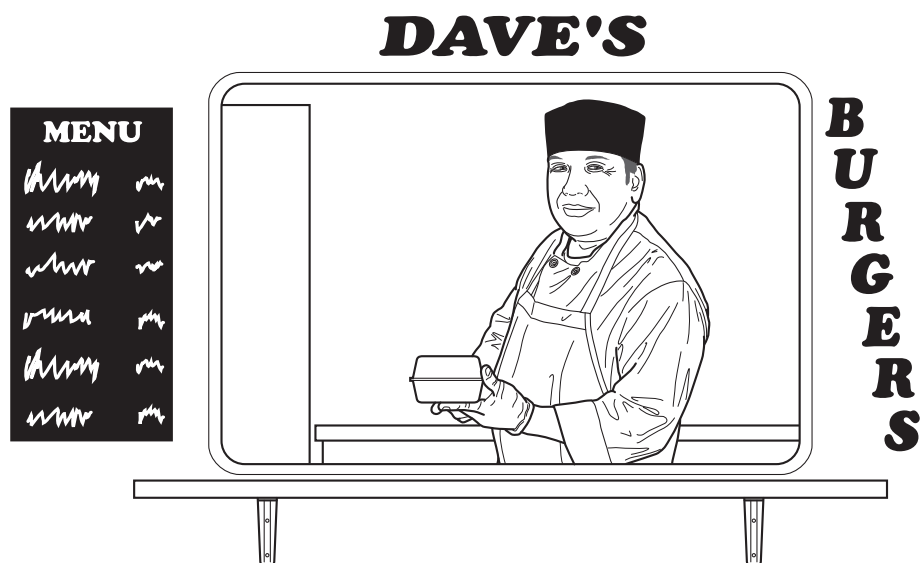
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **42**.
- This document consists of **20** pages. Any blank pages are indicated.

Answer **all** the questions.

1



Dave sells hot burgers. He packs them in boxes.

He chooses the material for the boxes.

Look at the properties of different materials shown in the table below.

material	cost	heat insulation	melting point in °C	strength
low density poly(ethene) (LDPE)	low	poor	80	low
high density poly(ethene) (HDPE)	high	poor	180	high
polystyrene	medium	good	240	low

(a) Dave chooses polystyrene.

Which **two** properties make this the best choice?

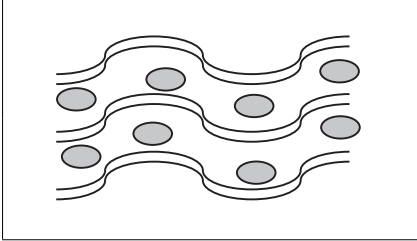
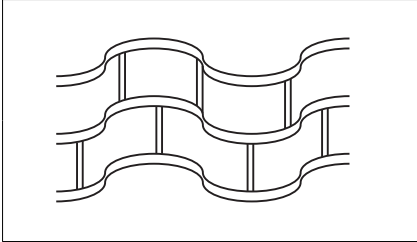
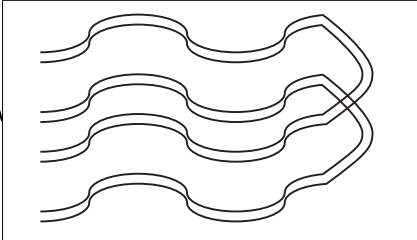
Put ticks (✓) in the boxes next to the **two** correct answers.

- cost
- heat insulation
- melting point
- strength

[2]

(b) The properties of plastics depend on how the particles they are made from are arranged and held together.

Draw a straight line from each type of **arrangement** to the correct **diagram** and then to the **change in property**. One has been done for you.

arrangement	diagram	change in property
longer chain length		increased flexibility
added plasticiser		increased melting point
cross-linked		increased hardness

[2]

(c) Dave is advised to use cardboard boxes.

Using cardboard is **sustainable** and has **less environmental impact** than polystyrene.

Which of the statements explain why?

Put ticks (✓) in the boxes next to the **two** correct answers.

- Cardboard is made from wood and polystyrene is made from crude oil.
- Cardboard is more flexible than polystyrene.
- Both cardboard and polystyrene can be recycled.
- Cardboard rots but polystyrene does not.
- Cardboard was used for many years before polystyrene was invented.

[2]

(d) Polymers are made from crude oil.

Look at the sentences about making polymers from crude oil.

Some are true and some are false.

Put a tick (✓) in the correct box next to each sentence.

	true	false
Crude oil is mainly a mixture of hydrocarbon molecules.	<input type="checkbox"/>	<input type="checkbox"/>
Hydrocarbons are molecules made from water and oxygen only.	<input type="checkbox"/>	<input type="checkbox"/>
Crude oil contains polymers.	<input type="checkbox"/>	<input type="checkbox"/>
Small molecules from the crude oil are joined together to make polymers.	<input type="checkbox"/>	<input type="checkbox"/>

[2]

[Total: 8]

5
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Question 2 begins on page 6.

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2 This question is about fibres.

(a) Two students are testing the properties of different fibres.

Which fibre is made from a living thing?

Put a **ring** around the correct answer.

cotton

polyester

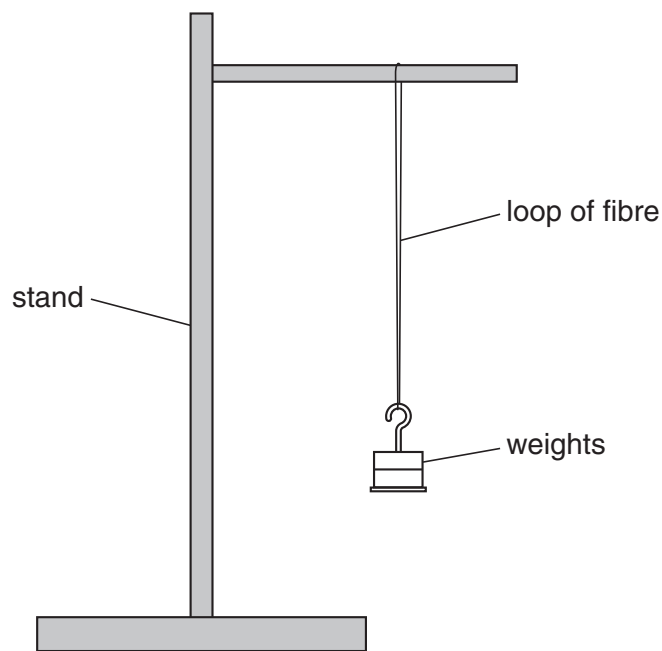
nylon

polypropene

[1]

(b) Mary and George are measuring the strength of different fibres.

A fibre is looped onto a support as shown in the diagram.



Weights are hung from the fibre until it breaks.

They repeat the test 5 times for each type of fibre.

(i) The length of each fibre is 30cm.

Suggest **one** other factor that should be controlled to make this test fair.

Explain why it should be controlled.

.....

.....

.....

.....

[2]

(ii) Here are Mary's results for cotton.

test number	1	2	3	4	5
weight to break fibre in N	0.60	1.45	0.90	1.35	0.70

What is the range of Mary's results?

..... N to N [1]

(iii) George also investigates cotton.

Here are his results.

test number	1	2	3	4	5
weight to break fibre in N	0.95	0.80	0.90	1.00	0.85

They decide to use George's results to work out the true value of the strength of the fibre.

Explain why it is correct to use George's results rather than Mary's.

.....

[2]

[Total: 6]

- 3 (a) The chart below shows the electromagnetic spectrum.

radio waves	microwaves	infrared	light	ultraviolet	X-rays	gamma rays
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- (i) Which part of the spectrum provides the energy for photosynthesis?

answer [1]

- (ii) Write down the part of the spectrum with the lowest energy photons.

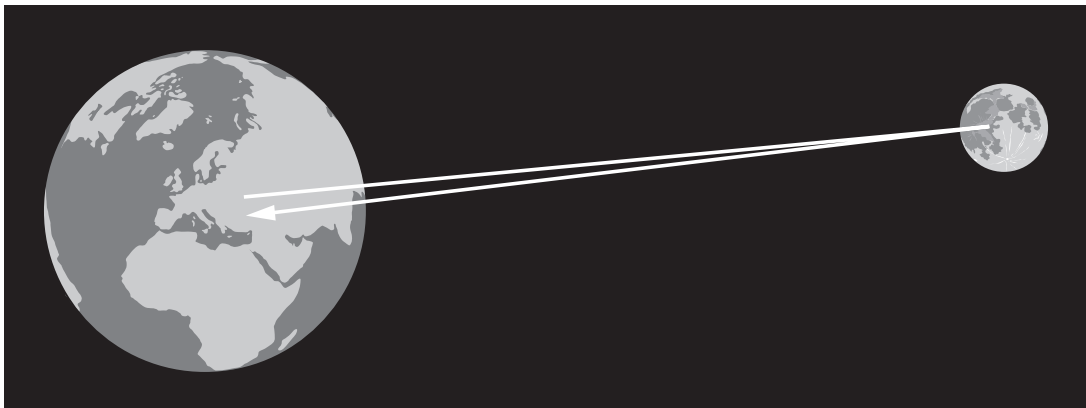
answer [1]

- (iii) Write down two parts of the spectrum used for transmitting information.

..... and [1]

- (b) Astronomers continuously measure the distance from the Earth to the Moon.

They use a laser, mirrors left on the Moon by astronauts and a detector on Earth.



Complete the sentences below using the **best** words from this list.

absorbs

emits

reflects

transmits

The laser on Earth light.

A mirror on the Moon the light.

The detector on Earth the light.

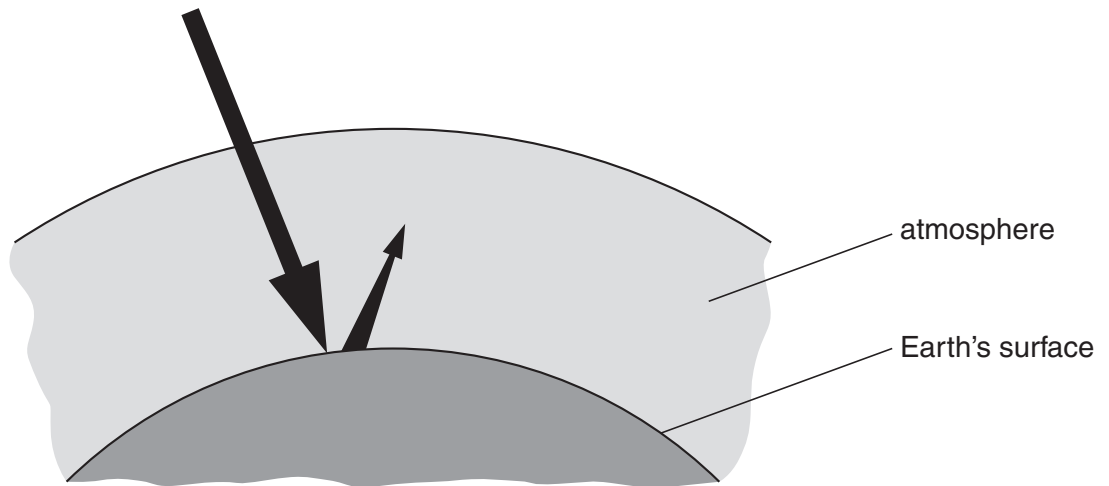
[2]

[Total: 5]

4 This question is about global warming.

Most scientists now agree that carbon dioxide produced by human activities is making the atmosphere warmer. This is due to the greenhouse effect.

(a) The diagram shows how the greenhouse effect works.



(i) The following statements explain the process in the diagram.

They are in the wrong order.

- A The atmosphere becomes warmer.
- B The energy is absorbed by the Earth.
- C The Earth is heated by the radiation.
- D The warm Earth gives off lower-energy radiation.
- E High energy radiation from the Sun reaches the Earth.
- F The infrared radiation is absorbed by greenhouse gases in the atmosphere.

Fill in the boxes to show the correct order.

The first one has been done for you.

E					
---	--	--	--	--	--

[2]

- (ii) If global warming continues, the sea level could rise everywhere. This would cause problems in some parts of the world.

Explain the problems this would cause in a city like London, which is not far above sea level.

.....

.....

..... [2]

- (b) Natural gas has become very expensive to use as a fuel in power stations. It is cheaper to burn coal.

Unfortunately, coal produces more carbon dioxide than any other way of generating power.

One way to solve this problem is called carbon capture and storage. All the carbon dioxide produced will be collected and stored deep underground. The carbon dioxide will dissolve in water in porous rocks.

These people are discussing global warming.

John
I saw on television that global warming could be quite natural, and it has nothing to do with carbon dioxide at all.

Kate
The level of carbon dioxide has been rising over the last 150 years, and so has the temperature of the atmosphere. There just has to be a link. We must use carbon capture.

Nora
There's no point in making changes to our power stations when India and China are burning so much coal. It will make no difference at all.

Mike
Carbon dioxide is definitely a greenhouse gas – it absorbs infrared. We should reduce the amount of carbon dioxide in the atmosphere.

(i) Who says that we must reduce the amount of carbon dioxide put into the atmosphere?

Put ticks (✓) in the boxes next to the **two** correct answers.

John

Kate

Nora

Mike

[1]

(ii) Who mentions a **correlation**?

Put a tick (✓) in the box next to the correct answer.

John

Kate

Nora

Mike

[1]

(iii) Who mentions a **cause**?

Put a tick (✓) in the box next to the correct answer.

John

Kate

Nora

Mike

[1]

[Total: 7]

5 Many people have holidays in very sunny countries.

The level of ultraviolet radiation in these countries can be high.

People on holiday in sunny countries know that ultraviolet can harm their skin.

Give one reason why people will sunbathe, even though they know that it can damage their skin.

In your answer, make sure you write about the **benefit** you would get from sunbathing as well as the **risk** you run.

.....

.....

..... [2]

[Total: 2]

6 This question is about the disease measles.

(a) Measles is caused by a type of microorganism.

Measles cannot be treated using antibiotics.

Put a **ring** around the type of microorganism that causes measles.

bacterium fungus virus

[1]

(b) People with measles have a high temperature, a rash and generally feel unwell.

Use words from the list provided to complete the sentences describing how microorganisms can make a person ill.

antibiotics

hair

infection

poisons

rapidly

skin

slowly

spreading

symptoms

A microorganism gets past the body's natural barriers such as

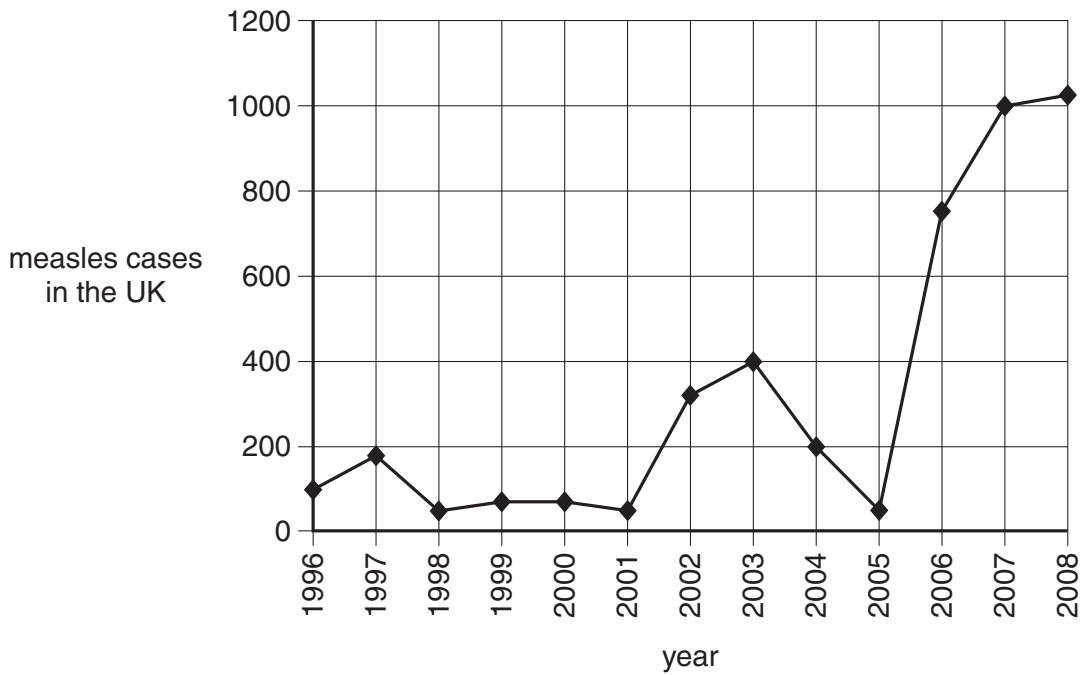
Once in the body the microorganism reproduces

Microorganisms damage our cells by producing

The damage to our cells causes of the disease.

[3]

(c) The graph shows the number of cases of measles in the UK from 1996 to 2008.



(i) Put ticks (✓) in the boxes to indicate which of the statements about the data in the graph are **true** and which are **false**.

statement	true	false
The number of measles cases rises and falls every three years.	<input type="checkbox"/>	<input type="checkbox"/>
There were about 10 times more cases of measles in 2008 than 1996.	<input type="checkbox"/>	<input type="checkbox"/>
The number of cases halved between 2003 and 2004.	<input type="checkbox"/>	<input type="checkbox"/>

[2]

(ii) Read this article about measles.

About one in every fifteen children with measles becomes seriously ill.

They may get chest infections, fits, swelling of the brain, and brain damage.

In very serious cases, measles can be fatal.

A measles vaccination can cause side effects. Many of these are mild, but there is a one in a million chance of inflammation of the brain.

Between 1998 and 2008 the percentage of children being fully vaccinated against measles fell to 85%. This was less than the rate doctors think is necessary to prevent a measles epidemic.

Explain **one** advantage and **one** disadvantage of vaccination against measles.

.....

.....

.....

..... [2]

(d) There is a 99% probability that a child vaccinated against measles will be immune to the disease for life.

Why does the child become immune?

Put ticks (✓) in the boxes next to the **two** correct answers.

- Red blood cells can engulf and digest measles microorganisms.
- White blood cells can now make antibodies against measles very quickly.
- White blood cells will change very quickly, confusing the measles microorganism.
- The body's natural barriers can now stop the measles microorganism from entering.
- White blood cells have been stimulated to produce antibodies against measles microorganisms.

[2]

[Total: 10]

7 Read the article about aspirin and heart disease.

New advice on aspirin

Around 80% of people with diabetes die of heart disease.

A daily dose of aspirin was recommended to prevent heart disease.

However, aspirin can cause the stomach to bleed.

A major, long term study was recently peer reviewed and reported in the British Medical Journal.

Doctors found there was no difference in the frequency of heart attacks between those given aspirin and those given a dummy pill.

The new advice is not to take aspirin as a preventative treatment unless you have a history of heart disease.

(a) Which life style factor makes heart attacks **less** likely?

Put a tick (✓) in the box next to the correct answer.

smoking

stress

regular exercise

excessive alcohol drinking

[1]

(b) Use the article to suggest **two** reasons why people with diabetes might decide not to take aspirin.

.....
.....
.....
..... [2]

(c) Heart disease is usually caused by blockages in the arteries that supply heart muscle.

Write down the name of the gas needed by heart muscle cells for them to respire.

answer [1]

[Total: 4]

END OF QUESTION PAPER

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